Volunteer Lake Assessment Program Individual Lake Reports
LEES POND, MOULTONBORO, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	17,664	Max. Depth (m):	11.3	Flushing Rate (yr[1])	12.9	
Surface Area (Ac.):	179	Mean Depth (m):	3.7	P Retention Coef:	0.37	
Shore Length (m):	4,000	Volume (m³):	2,675,000	Elevation (ft):	508	

TROPHIC CLASSIFICATION

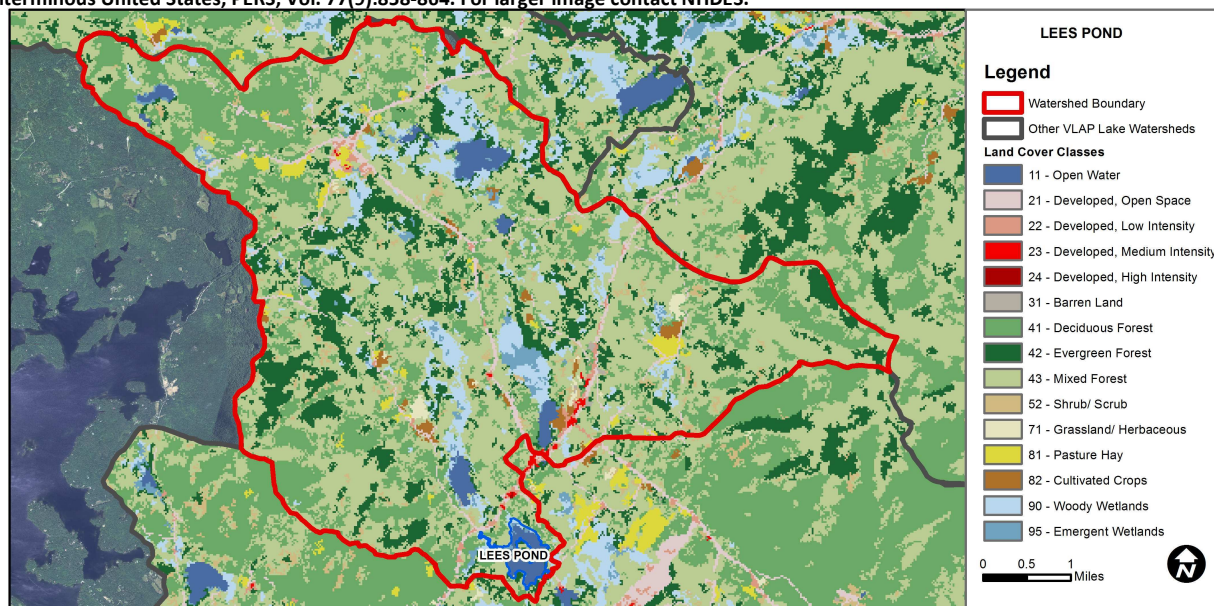| Year	Trophic class
1992	MESOTROPHIC
2009	EUTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Cautionary	There are < 10 samples with 1 exceedance of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.

LEES POND

Legend
- Watershed Boundary
- Other VLAP Lake Watersheds

Land Cover Classes
- 11 - Open Water
- 21 - Developed, Open Space
- 22 - Developed, Low Intensity
- 23 - Developed, Medium Intensity
- 24 - Developed, High Intensity
- 31 - Barren Land
- 41 - Deciduous Forest
- 42 - Evergreen Forest
- 43 - Mixed Forest
- 52 - Shrub/ Scrub
- 71 - Grassland/ Herbaceous
- 81 - Pasture Hay
- 82 - Cultivated Crops
- 90 - Woody Wetlands
- 95 - Emergent Wetlands

Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	2.39	Barren Land	0.08	Grassland/Herbaceous	0.38
Developed-Open Space	2.69	Deciduous Forest	22.71	Pasture Hay	1.25
Developed-Low Intensity	0.63	Evergreen Forest	13.64	Cultivated Crops	0.75
Developed-Medium Intensity	0.15	Mixed Forest	45.77	Woody Wetlands	6.36
Developed-High Intensity	0.01	Shrub-Scrub	1.77	Emergent Wetlands	1.34

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

RECOMMENDED ACTIONS: Epilimnetic and metalimnetic phosphorus and turbidity levels have remained higher than normal since 2013, and chlorophyll levels were also above average in 2014 and 2015. The exact cause is unclear, however if above average levels continue, it is cause for concern. Higher phosphorus levels promote algal and cyanobacteria growth as experienced in 2015. Volunteers should remain alert and make observations of activities that may prompt excess nutrients, turbidity and algal growth. Observe pond conditions prior to milfoil management activities and post management activities to assess how they impact water quality. Report anything out of the ordinary to DES for further investigation. Keep up the great work!

OBSERVATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

- **CHLOROPHYLL-A:** Chlorophyll levels were low in June, increased to elevated levels indicative of an algal bloom in July, decreased slightly in August, and then decreased to low levels in September, however a cyanobacteria bloom was confirmed in early September. Average chlorophyll levels were greater than the state median and stable with that measured in 2014. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability since monitoring began.
- **CONDUCTIVITY/CHLORIDE:** Deep spot, Inlet and Outlet conductivity and chloride levels were average for N.H. lakes and slightly greater than the state medians. Average conductivity levels increased in 2015 potentially due to the harsh winter and dry summer weather conditions. Historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity levels since monitoring began and Outlet conductivity has also significantly increased.
- **E. COLI:** Nelson Beach E. coli levels were very low and much less than the state standard 88 cts/100 mL for public beaches.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were low in June, increased to slightly elevated levels in July and August when algal growth was highest, and then decreased in September. Average epilimnetic phosphorus was slightly greater than the state median and has increased since 2011. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Metalimnetic (middle water layer) phosphorus levels were average in June, increased to elevated levels in July prompting the elevated algal growth, and then decreased to an average range in August and September, however 2015 average metalimnetic phosphorus was the highest measured since 1997. Hypolimnetic (lower water layer) phosphorus levels were average in June and then increased to elevated levels from July through September and turbidity was also elevated. Inlet and Outlet phosphorus levels were within average ranges for those stations.
- **TRANSPARENCY:** Transparency was good in June, decreased in July and August due to the elevated algal growth, and then improved to a good range in September making the 2015 average transparency approximately equal to the state median. Historical trend analysis indicates highly variable transparency since monitoring began.
- **TURBIDITY:** Epilimnetic turbidity was low in June and September and slightly elevated in July and August due to the elevated algal growth. Metalimnetic turbidity was slightly elevated during each sampling event and remained stable from June through September. Average epilimnetic and metalimnetic turbidities have remained slightly elevated since 2013. Hypolimnetic turbidity was low in June and then increased to elevated levels as the summer progressed and dissolved oxygen levels decreased. This can result in the formation and accumulation of organic compounds in the hypolimnion. Inlet turbidity was low and Outlet turbidity was slightly elevated in July.
- **PH:** Epilimnetic pH was within the desirable range 6.5-8.0 units however metalimnetic and hypolimnetic pH levels were less than desirable throughout the summer. Historical trend analysis indicates relatively stable epilimnetic pH since monitoring began. Inlet and Outlet pH levels were also within the desirable range.

Dissolved Oxygen & Temperature Profile, Summer 2015

Lees Pond Algal Population September 2015
(Greens, Cryptomonads, Cyanobacteria, Golden Brown, Dinoflagellates, Diatoms)
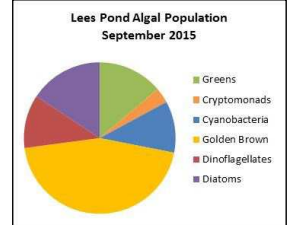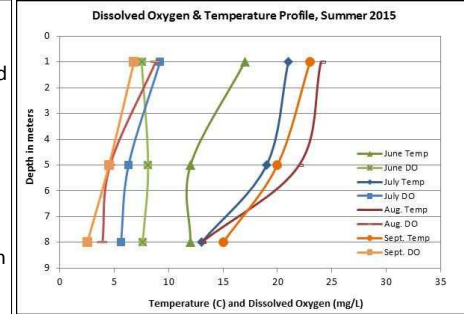
NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Station Name	Table 1. 2015 Average Water Quality Data for LEES POND									
	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli MPN/100ML	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	10.0	7.50	10	64.6		15	3.23	3.43	1.47	6.78
Metalimnion				61.5		17			1.71	6.26
Hypolimnion				59.3		36			5.97	6.13
Inlet			10	67.9		14			0.96	6.71
Nelson Beach					13.4					
Outlet			10	60.7		11			1.19	6.65
Red River			8							

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data